R&D
Research & Development

2003 R&D 100 Awards
Winners and Entries

1943 - 2003
Los Alamos
NATIONAL LABORATORY
Ideas That Change the World

2003
R&D 100 Awards
Winners and Entries

1943 - 2003
Los Alamos
NATIONAL LABORATORY
Ideas That Change the World

From the Director

The recognition Los Alamos National Laboratory receives through its participation in *R&D* magazine's annual, international, R&D 100 Awards competition calls attention to the broad scope of achievements that the Laboratory contributes to technological innovation in this country and, indeed, the world. Our discoveries in science and the applications that result play an important role in shaping the future of our nation. When we transfer our inventions and technological advances from the Laboratory to the private sector for commercial development, we strengthen the nation's economic security by enhancing our industrial competitiveness.

I commend our researchers for the diligence and creativity they have applied to developing the technologies submitted to this year's competition. I am pleased with the diversity of applications, which range from data transmission and security enhancements to health and safety, manufacturing, and energy sustainability. It is important to remember that these potentially award-winning technical and scientific innovations have been born out of Los Alamos' goal to create science that truly serves society. I believe every submission represented here is a winner for the Laboratory, the University, and the American taxpayers.

G. Peter Nanos, Jr.
Laboratory Director

The R&D 100 Awards

For the past 25 years, Los Alamos National Laboratory has submitted descriptions of its most innovative technologies to *R&D* magazine's annual R&D 100 Awards competition. This competition is designed to honor significant commercial promise in products, materials, or processes developed by the international research and development community. Technologies are nominated in open competition and judged by technical experts selected by the Illinois-based *R&D* magazine. The magazine uses technical criteria to select the 100 most significant, unique, or promising entries from the nominations received. According to the selection panel, "The sole criterion for making the grade is demonstrable 'technological significance' compared with competing products and technologies. Issues such as smaller size, faster speed, greater efficiency, and higher environmental consciousness have continued to gain importance in successful award submissions."

Los Alamos has been competing successfully for more than two decades with many of its winning technologies developed in collaboration with private-sector companies and other scientific institutions. The Laboratory won two awards in 2002 and has received more than 80 awards since it began competing in 1978.

J. Wiley Davidson
Thomas Farish
Roy Goeller
Norman Hamer
Stephen Mortenson
Patricia Nickel
Nicholas Olivas
Gary Salzman
Ralph Stiglich
Phillip Stroud
Thomas Wehner
Douglas Weiss
Los Alamos National Laboratory

Julie R. Avila
Jacquelyn W. Cofield
Patsy A. Gilbert
Bruce D. Henderer
Robert K. Johnson
Paula M. McCready
Nancy K. Montgomery
Virginia S. Montgomery
Linda L. Ott
Richard Parker
Paul D. Sargis
Cheryl L. Strout
Thomas R. Slezak
Mark C. Wagner
Lawrence Livermore National Laboratory

Mark R. Weitekamp
Consultant to LLNL

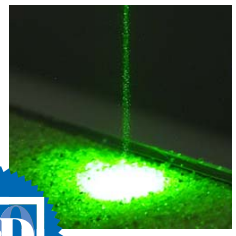
Lauren Basch
Matthew Bivans
Rupprecht and Patashnick Co., Inc.

BASIS: High-Confidence Biothreat Detection and Characterization

The Biological Aeorsol Security and Information System (BASIS) is a technology for protecting civilian populations against terrorist aerosol releases of microorganisms capable of inducing lethal infection. It enables the detailed identification, localization, and time-of-release pinpointing of select aerosol-released organisms. In turn, this precise detection facilitates the expeditious treatment of exposed individuals before symptomatic onset, a medical response capable of saving lives. By reducing the rate of false positives to nearly zero, BASIS prevents the potential disruption of civilian life that such false alarms would likely provoke. It protects civilian populations by expeditiously mobilizing medical responses and providing detailed forensic evidence about organisms used in bioterrorism, thereby engendering a broader umbrella of readiness and facilitating criminal investigations. BASIS can be deployed in a broad spectrum of locations where population clusters could be targeted by bioterrorists.

Applications

- Population centers (e.g., transportation terminals/portals)
- Border checkpoints
- Seats of government
- Critical infrastructure nodes (e.g., power plants)
- Tunnels and bridges
- Sports and entertainment venues



David A. Cremers
Monty J. Ferris
Roger C. Wiens
Los Alamos National Laboratory

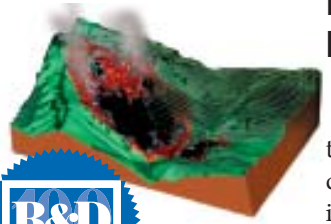
Paul G. Lucey
Shiv Sharma
University of Hawaii

CARISS: Integrated Elemental and Compositional Analysis

CARISS (Compositional Analysis by Raman-Integrated Spark Spectroscopy) is the only field-deployable instrument that provides a complete chemical analysis (elemental and compositional) of a material at close, stand-off, and remote distances. CARISS uses two laser beams to conduct such analyses. The rugged instrumentation, highly adaptable to real-world analysis situations, provides rapid—less than two minutes per sample—"hands-off," measurement, reducing analysis time and cost by at least a factor of 100. Designed for analysis in the field, CARISS can fit into a briefcase or a lunchbox, depending on the application. The versatility and portability of the instrument will allow it to sample Martian surface materials from a Mars rover; verify the composition of bobsled runners at the Olympic Games to enforce international rules and regulations; and detect carbon in soil for use in terrestrial carbon sequestration programs aimed at reducing global warming.

Applications

- Carbon detection (organic and inorganic) in soil
- Soil monitoring for the presence of toxic metals and harmful organic compounds
- Chemical agent detection for homeland defense and customs surveillance efforts
- Identification of materials used in weapons of mass destruction
- Industrial process control and mining operations



FIRETEC: A Physics-Based Wildfire Model

Rodman Linn
James Bossert
Jonah Colman
Francis Harlow
Jon Reisner
William Smith
Judith Winterkamp
Los Alamos National Laboratory

Carleton Edminster
USDA, Forest Service, Rocky Mountain Research Station

FIRETEC is the first physics-based, three-dimensional (3-D) computer code designed to simulate the constantly changing, interactive relationship between fire and its environment. It does so by representing the coupled interaction among fire, fuels, atmosphere, and topography on a landscape scale (hundreds or thousands of meters). FIRETEC combines physics models that represent combustion, heat transfer, aerodynamic drag, and turbulence with a computational fluid-dynamics model that represents airflow and its adjustments to terrain, different types of fuel (vegetation), and the fire itself. Unlike the empirically based models currently used in the field, FIRETEC simulates the dynamic processes that occur within a fire and the way those processes feed off and alter each other. FIRETEC provides a sophisticated analytical tool for fire, fuel, and land managers and has significant potential to help prevent loss of life, property, and natural resources.

Applications

- Predicting wildfire behavior in rugged terrain under various atmospheric conditions
- Optimizing fuel-management strategies
- Investigating how fire interacts with various fuels
- Determining causes of dangerous changes in a wildfire's behavior
- Providing realistic simulations for training inexperienced fire fighters

FlashCT™

Thomas N. Claytor
David M. Stupin
Deborah A. Summa
Los Alamos National Laboratory

Anthony Davis
Scott Keating
David Phillips
Sensors & Imaging Group
Tim Thompson
HYTEC Inc.

FlashCT™ is a high-speed, industrial, computed tomography (CT) scanning system for producing high-resolution, three-dimensional (3-D) images of the external and internal geometries of objects. Once appropriate only for laboratory use, its vastly improved software and off-the-shelf components now make it feasible for high-throughput, in-line manufacturing applications. As a result, FlashCT is being used in unforeseen ways, notably in the mass production of customized parts. New uses of FlashCT are beginning to make significant changes in the way manufacturing is done. FlashCT applies to any process that requires the nondestructive scanning of an object. Its use in prototyping mass-produced custom devices (mass customization) streamlines the manufacturing process, increases throughput, reduces overall manufacturing costs, is clean, and eliminates environmentally harmful by-products used in other processes.

Applications

- Prototyping mass-produced, customized, orthodontic devices
- Inspecting parts or components for quality-assurance purposes
- Comparing "as-built" hardware to design intent
- Recreating parts when design drawings are no longer available
- Evaluating manufacturing errors
- Inspecting archaeological, geological, and paleontological samples

Flexible Superconducting Tape

Paul N. Arendt
Raymond F. DePaula
Paul C. Dowden
Stephen R. Foltyn
Brady J. Gibbons
J. Randy Groves
Quanxi Jia
Sascha Kreiskott
Vladimir Matias
Dean E. Peterson

The world's need for electricity has led to rising power costs; dependence on oil and coal, both of which are becoming scarce; and rising pollution levels. An ideal solution to this problem would be a technology that can transmit electricity with no resistive losses. The Laboratory has developed a superconducting tape that carries high currents in high magnetic fields at liquid-nitrogen temperatures. At such temperatures, the tape carries current with no resistance and is flexible enough to be wrapped into a tight coil with no loss of superconductivity. The innovative tape design can carry 200 times the electrical current of copper wire. Widespread use of this tape will reduce costs associated with electrical power transmission and generation, and reduce the electrical requirements of the planet, thus conserving resources and reducing global pollution.

Applications

- Instruments that require large amounts of power, such as power transmission lines, motors, generators, and transformers
- Magnetic resonance imaging for medical diagnostics
- Superconducting magnets that can play a role in magnetically levitated trains and research accelerators and colliders
- Fault current limiters and current leads
- Nuclear magnetic resonance instruments used in the chemical industry

Green Destiny

Wu-chun Feng
Michael S. Warren
Eric H. Weigle
The RADIANT Team
(Contributions from
Wu-chun Feng, Eric Weigle,
Mark Gardner,
Adam Engelhart)

Green Destiny is the world's most efficient supercomputer. For nearly a year, Green Destiny has run without any downtime in a dusty 85° F warehouse that has no facilities for cooling, humidification control, or air filtration while occupying less than 6 square feet and drawing at most 5.2 kilowatts of power for the 240-processor system. Conventional supercomputers require customized, expensive infrastructure, e.g., cooling, or even a new building. Green Destiny redefines "performance" as much more than speed at any cost, the current ranking criteria for supercomputers. And, because many projects and institutions do not have the money to invest in or sustain the total cost of ownership of conventional supercomputers, the supercomputing capacity and efficiency provided by Green Destiny is recognized worldwide as an affordable and environmentally sustainable alternative. Green Destiny is a platform for high-performance computing tasks.

Applications

- Traditional Web hosting and Web-server farms
- E-commerce
- Financial services
- Space and satellite communications
- Scientific applications
- Desktop supercomputing
- Smart house

2003 Winner

Arthur J. Koehler
Donna Caporale
Thomas Lange
Michael Looney
Jonathan Tan
The Procter & Gamble Company

Michael S. Hamada
Harry F. Martz, Jr.
Los Alamos National Laboratory

PowerFactoRE— A Suite of Reliability Engineering Tools for Optimizing the Manufacturing Process

PowerFactoRE is a comprehensive methodology and an integrated suite (toolkit) of reliability engineering tools that introduces a new way of thinking about the manufacturing process. The result of an effective collaboration between the Laboratory and Procter & Gamble, it comprises a unique set of proven methods, statistical and analytical tools, simulation software, procedures, and training that enable manufacturing line managers to understand reliability losses and to correct seemingly isolated defects in the manufacturing process. PowerFactoRE gathers and analyzes production data; fits the data with accurate statistical distributions to build a simulation of the system; and validates the system model. It allows a manufacturer to improve the current system or to evaluate a completely new configuration. It can be applied across a wide range of businesses to increase productivity, guide capital investments, and increase production. It is currently being used in more than 200 plants worldwide.

Applications

- Predicting, reducing and preventing manufacturing equipment failures
- Improving product quality and increasing throughput
- Improving bottom-line results through higher reliability
- Reducing operating and capital expenses

2003 Winner

Darren Naud
Michael A. Hiskey
Steven F. Son
James R. Busse
Los Alamos National Laboratory

Kenneth Kosanke, PyroLabs, Inc.

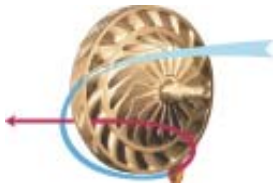
Super-Thermite Electric Matches

Have you ever attended an elaborate fireworks display choreographed to music and other special effects? To achieve such awe-inspiring shows, experts in pyrotechnics use electric matches, which consist of small ignition elements specifically designed to ignite fireworks remotely and with precise timing. Unfortunately, conventional electric matches use lead-containing compounds that are extremely sensitive to impact, friction, static, and heat stimuli, thereby making them dangerous to handle. In addition, these compounds produce toxic smoke. The Super-Thermite electric matches produce no toxic lead smoke and are safer to use because they resist friction, impact, heat, and static discharge through the composition, thereby minimizing accidental ignition. They can be designed to create various thermal-initiating outputs—simple sparks, hot slag, droplets, or flames—depending on the needs of different applications.

Applications

The principal application is in the entertainment industry, which uses fireworks displays for a variety of venues, such as sporting events, holiday celebrations, and musical and theatrical gatherings. Secondary applications include

- triggering explosives for the mining, demolition, and defense industries,
- setting off vehicle air bags, and
- igniting rocket motors



David Platts

Advanced, Single-Rotor Turbine (ASRT) Engine

The ASRT engine is a revolutionary centrifugal-turbine design featuring the compressor and turbine sections cast as a single piece. The design channels fresh outside air through the hollow turbine blades as the air travels to the combustion chamber—cooling the blades without mixing unheated air with the combustion products. This design also increases efficiency by preheating the air destined for the combustion chambers. The ASRT engine design can be used in any application that currently uses the centrifugal gas turbine. Because the ASRT engine design cools the critical turbine section, it allows the engine to operate either at higher temperatures, using its fuel much more efficiently, or conventional temperatures but be constructed from cheaper, lower-temperature alloys. Additionally, the one-piece compressor/turbine reduces engine complexity and weight, reducing manufacturing, operating, and maintenance costs, and increasing the engine's standard operating lifetime.

Applications

- Jet engines for small aircraft
- Turboshaft engines for turboprop aircraft, helicopters, tanks, and other vehicles
- Distributed-power generators at industrial and commercial sites and aboard ships
- Residential distributed power units
- Portable personal power units

Jared S. Dreicer
Paul D. Johnson
Anders M. Jorgensen
Robert J. Nemzek
Ralph E. Stiglich
Jerome C. Romero
Ryan C. Sanchez
Sarah Stokes

DSN-CC: Distributed Sensor Network with Collective Computation

DSN-CC, a distributed sensor network with collective computation, is an economical, portable, and potentially concealable detection system. It consists of a set of smart sensor nodes that communicate with neighboring sensors to cooperatively solve a sensing problem. It can detect and locate events such as a gunshot or a vehicle passing through a tunnel delivering detection to the source. Sensors near the event collect the raw data, "compare notes," negotiate a conclusion as to what the signal is and where it originated, and propagate the conclusion across the network, eliminating the need for a central processing station. Users obtain DSN-CC conclusions by listening in to any part of the network. Because the information and subsequent conclusions ultimately exist everywhere on the network, only short transmissions are required. The sensors can be small enough to be disguised as a rock.

Applications

- Signal detection by military, federal government, commercial businesses, and the general public
- Ground-based surveillance, weapons-proliferation detection, home-intruder detection, and critical-facilities protection
- Medical diagnostics once miniaturization with nanotechnology becomes feasible

Benjamin P. Warner
Anthony K. Burrell
Simon B. Hall
T. Mark McCleskey
Los Alamos National Laboratory

Anoop Agrawal
Gordon Goodyear
ElectroChromiX Inc.

Electrotint: Reversible Tinted Windows

Keeping office buildings with thousands of windows comfortably cool, particularly during the spring and summer months, can be a daunting task. Electrotint windows, developed in collaboration with ElectroChromiX, Inc., can quickly go from a colorless to a deeply colored—or mirrored—state and back again. The windows have been designed to let in 75% of visible light during fall and winter and block 90% of light during spring and summer. The proprietary dyes and chemical formulations used in Electrotint windows and mirrors do not rely on hazardous chemicals and will not degrade, swell, break down seals, or evaporate—problems that are common to conventional electrochromic windows. Electrotint formulations integrate easily into modern architectural and vehicular designs and manufacturing processes and are cost-effective, reducing the price per square foot (base window excluding control systems) by 80–95% compared with solid-state electrochromic windows.

Applications

- Energy-efficient building windows—optimizing heat gains and losses through windows and enhancing the use of daylight can save the US approximately 5% in energy consumption each year
- Rear- and side-view vehicle mirrors—elimination of headlight glare, can reduce automotive accidents

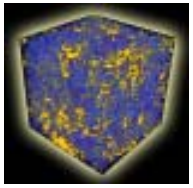
Richard E. Lujan

Gravity Brake

The gravity brake is a simple, reliable mechanical brake for protecting and positioning hoisted loads, such as diagnostic tools that are being lowered or raised within a vertical shaft. The hoisting cable connects to the top of the gravity brake and the load attaches underneath the gravity brake. As the load is lowered (or raised), the gravity brake is subject to the lifting force of the hoist and the downward (gravitational) force of the load. A sudden loss of the lifting force causes the gravity brake to swing its brake pads outward until they contact the shaft walls. The brake uses the load's weight to generate the requisite braking force. If the sudden loss is accidental, the gravity brake prevents the load from free-falling down the shaft. If the loss is intentional, the brake precisely positions and suspends the load within the shaft. The gravity brake can be configured to work in varying shaft geometries and sizes and to support varying load weights. It is an inexpensive, reliable mechanical braking system that can provide fail-safe mechanical backup to electronic braking systems.

Applications

- Preventing hoisted loads from free-falling within a vertical shaft or tunnel
- Positioning loads, such as testing or diagnostic equipment, precisely within vertical shafts



Darryl D. Holm
Katharine Chartrand
Christopher A. Jeffery
Susan Kurien
Robert C. Malone
Len G. Margolin
Jamaludin Mohd-Yusof
Balu Nadiga
Zhijun Qiao
Ray Ristorcelli
Martin F. Staley
Mark Taylor
Beth Wingate
Los Alamos National Laboratory

Thomas S. Jensen
Flow Science, Inc.

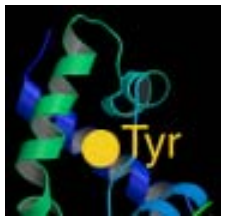
International Turbulence Working Group

LANS-alpha Turbo-Simulator—A New Approach to Simulating Turbulence

The LANS-alpha Turbo-Simulator is a fast, accurate, and very cost-effective modeling tool used for numerically simulating the effects of turbulence at a user-prescribed length scale (alpha). Its predictions agree accurately with classic turbulence experiments. Because it uses a novel mathematical approach, its capabilities are unique among existing turbulence simulators for preserving the essential properties of convection and circulation in numerical calculations of turbulent flow. In many comparison tests, its performance in speed and accuracy considerably exceeds that of other turbulence simulation methods. Scientifically, it is derived from basic principles that readily incorporate additional physical processes, so it is flexible and easy to learn and use. For numerically predicting turbulence effects, the LANS-alpha Turbo-Simulator provides benefits that are unavailable with any other turbulence simulation method.

Applications

- Estimating the effects of turbulence at limited spatial and temporal resolution
- Extending the computational capability of existing numerical codes
- Modeling turbulence in areas such as global climate modeling; industrial design of wings, propellers, and jet engines; control of production processes that use turbulent fluid flows



Xian Chen
Fadi Abdi
E. Morton Bradbury
Sheng Gu
Thomas Hunter
Vahid Majidi
Songqin Pan
Los Alamos National Laboratory

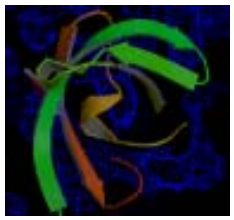
Lloyd M. Smith
University of Wisconsin-Madison

Molecular Tagging: The Key to Effective Disease Diagnostics and Therapeutic Intervention

Have you ever put a wrong word in a crossword puzzle? When this happens, it tends to throw off the entire puzzle, principally because one word can affect others. The same thing can happen when trying to unravel something infinitely more complex, such as the human genome, in which an unsigned base may hold the key to unraveling a disease-related gene. This unique molecular-tagging technique uses site-specific stable-isotope markers to enhance the specificity, accuracy, sensitivity, and throughput of conventional mass spectrometry, a technique that could help "interpret" the human genome and functional proteome. Using such data, scientists can better understand how cells work and how diseases operate at a molecular level. Such knowledge will help doctors develop new pharmaceuticals and treatment options for a variety of genetic diseases.

Applications

- Large-scale DNA and protein analyses performed quickly, easily, and cost-effectively
- Screening for genetic variants—may help scientists unravel the nature of many genetic diseases
- Identification and quantification of cellular proteins (particularly those whose expression levels are affected by disease), as well as any post-translational modifications (the sensitive markers for diseases)



Thomas C. Terwilliger

RESOLVE: Automated Software for Protein Research

Have you ever watched a television show with poor reception? The fuzzy picture on the screen often makes it difficult to discern the characters and the action, making for a frustrating evening at home. In the world of proteomics, the new RESOLVE software helps researchers get clear pictures of protein structures, allowing the researchers to develop new pharmaceuticals and to understand how proteins work. A fully automated software package, RESOLVE improves the accuracy and detail of protein images obtained from X-ray crystallography. RESOLVE then interprets these images and builds accurate atomic models of the proteins. Used across the globe by more than 20 pharmaceutical companies and more than 300 academic institutions, RESOLVE produces a detailed model of a protein's shape, which defines its biological activity. RESOLVE provides a quick and cost-effective means of generating high-quality models.

Applications

- Helping researchers develop more effective pharmaceuticals and treatments for genetic diseases ranging from epilepsy and hemophilia to asthma and many types of cancer
- Enhancing scientific understanding of protein functions ranging from defensive and hormonal to transport and enzymatic

Karen M. Grace
Basil I. Swanson

LANL Optical Biosensor Team
Roy M. Goeller
W. Kevin Grace
Daniel E. Hooks
Mervyn Kellum
Jerome D. Kolar
Sabine A. Lauer
Siegfried N. Lodwig
Leland J. Morrison
Scott M. Reed
Gary Richardson
Amelia A. Roybal
Jurgen G. Schmidt
Jeane Shane (deceased)
Andrew P. Shreve
Gary Smith
Martin R. Sweet
Clifford J. Unkefer
James H. Werner
Gary Wiig
Los Alamos National Laboratory

Xuedong Song
Former LANL Employee

Walter J. Doherty
Sergio Mendez
Scott Saavedra
University of Arizona

John T. Bradshaw
Artel, Inc.

ROB: Reagentless Optical Biosensor

ROB quickly identifies and quantifies pathogenic proteins in complex fluid samples such as serum. ROB consists of two main components: a protein-specific assay cartridge and a sensor readout unit. Modeled on host-pathogen interactions, its membrane-based assay provides highly specific and sensitive detection of pathogens. The hand-held biosensor, based on evanescent excitation, minimizes background interference, greatly reducing the chance of false positives. ROB is battery operated, reagent free, simple to use (a single step), and fast (yields results in less than 15 minutes). Because the assay is contained in an inexpensive disposable cartridge, ROB can detect different pathogens with the quick switch of the cartridge. ROB requires little or no training for users and supplies robust sensitivity and specificity at lower costs than competing technologies.

Applications

- Detecting contamination in global water and food supplies
- Diagnosing infection resulting from biothreat agents or naturally occurring diseases in primary care settings
- Monitoring the effectiveness of medical treatments
- Helping to track, in realtime, the onset and spread of epidemics
- Surveying and identifying production facilities where illicit substances are being made (e.g., bioweapons)

Drew Geller
Greg Swift

Sonic Separator

The Sonic Separator is a new apparatus that uses sound waves to separate gas mixtures. A pure (single-frequency) tone sent through a gas mixture in a closed tube causes the mixture to separate, with one component of the mixture enriched at one end of the tube and the other enriched at the other end. The Sonic Separator requires only an off-the-shelf signal generator as well as amplifiers and speakers that can be purchased at any electronics outlet. The Sonic Separator is a simple, reliable, and small-scale technology appropriate for high-tech industries that cannot use the traditional separation methods of distillation and diffusion. In addition, the Sonic Separator separates even notoriously difficult isotope and isomer mixtures. It operates at ambient temperature and atmospheric pressure and accomplishes gas separation with no release of toxic gases.

Applications

- Separating tritium from hydrogen for fusion energy, a potential source for a global energy supply
- Supplying stable isotopes specifically for medical MRIs
- Expanding the currently limited supply of carbon-13, nitrogen-17, and oxygen-17, required by hospitals and biological and medical research facilities

Pat J. Unkefer
Rudolfo Martinez
Los Alamos National Laboratory

Thomas J. Knight,
University of Southern Maine

Take-Off™

Take-Off, a metabolic plant stimulant, increases plant photosynthesis rates by coordinating a plant's uptake of nitrogen from the soil and its use of carbon dioxide for growth. As a synthesized version of a naturally occurring plant metabolite (an amino acid), Take-Off accelerates growth—thereby speeding plants to maturity and harvest—and enhances yield without the use of growth hormones. It can be applied as a spray to a plant's leaves or added to water and nutrient solutions to be absorbed by the plant's root system. Both application methods are equally effective. Some of the benefits Take-Off provides, minus the growth hormones that necessitate expensive compliance with Environmental Protection Agency regulations, include multiple crop cycles per acre in each growing season; reduced water and fertilizer requirements through shortened growing time; and a reduction in polluting nitrate runoff from fields through increased nitrogen uptake.

Applications

- Fresh vegetables
- Citrus fruits
- Fresh flowers
- Biomass (plants raised to be burned as fuel or used as quick-growing ground cover in areas damaged by mining or wildfire)

Los Alamos National Laboratory R&D 100 Award Winners 1978–2001

1978
- Diamond Machining of Optics
- Electronic Identification System
- Electronic Device for Treating Tumors—Hyper Thermic Cancer Treatment

1980
- Wee Pocket Radiation Detector
- Portable Multichannel Analyzer

1981
- Radio Frequency Quadrapole Linac

1982
- WC Field Computer System

1983
- Transuranic Waste Assay System

1984
- Superconducting Magnetic Energy System

1985
- BHTP—A Unique Scintillation Compound

1986
- Aurora Laser Beam Alignment System

1988
- Optical Microrobot Single-Cell Manipulator/Analysis System
- Nuclear Material Solution Assay System
- 32-Stepper Motor Position Controller
- Mobile Beryllium Monitor
- HTMS Reference Electrode
- Oriented, Highly Anisotropic Conducting Polymer
- Photoinjector for RF Linac Accelerators
- Lattice Gas Algorithm

1989
- Fourier Transform Flow Cytometer (FTCS-1)
- Noncontact Superconductor Screening
- Conductive Lattices

1990
- Coolahoop
- Universal Process for Fingerprint Detection
- Fast Agarose Gel Electrophoresis (FAGE)
- Solid-State NO_2 Sensor
- Upconversion Solid-State Laser
- A Broadband (ABB) Mw Absorption Spectrometer for Liquid Media
- MdS2/SC Composites (Molybdenum Disilicide/Silicon Carbide)

1991
- Semi-Insulator Detector
- Optical High-Acidity Detector
- Resonant Ultrasonic Inspection (RUI)
- Single Molecule Detector

1992
- Thermal Neutron Multiplicity Counter
- Plastic Laser Dye Rods
- Cryogenic Diamond Turning
- Portable Laser Spark Surface Mass Analyzer (PLASSMA)
- Zeeman Refractive Index Detector
- Animated Display of Inferred Tongue, Lip, and Jaw Movements During Speech

1993
- Selenium-Based Reagents for the Evaluation of Chiral Molecules
- Phase-Sensitive Flow Cytometry
- Ultrafast Infrared Spectometer
- Mini Elastic Backscatter Lidar

1994
- Ultrasensitive Ultrasonic Transducer
- Telemetric Heat Stress Monitor
- Optical Biopsy System
- Lattice Boltzmann Permeameter
- Directed Light Fabrication of Complex Metal Parts
- Bartas Iris Identification

1995
- The Indigo-830
- ARS Chemical Fill Detector
- Hydride-Dehydride Recycle Process
- HIPPI-SONET Gateway
- Microsensor for VOCs
- Polymer Filtration System

1996
- TRACER (Transportable Remote Analyzer for Characterization & Environmental Remediation)
- PLASMAX (Plasma Mechanical Cleaner for Silicon Wafers)

1997
- Falcon: Breakthrough Software for Simulating Oil Reservoirs
- Rapid Size Analysis of Individual DNA Fragments
- ASR Detect—Diagnostic Method for Analyzing Degrading Concrete
- Dry Wash
- Plasma Source Ion Implantation for Enhancing Materials Surfaces
- High Performance Storage

1998
- Cyrax™—Portable, 3-D Laser-Mapping and Imaging System
- Low-Smoke Pyrotechnics
- SOLVE—Creating 3-D Pictures of Protein Molecules from X-Ray Diffraction Spots
- Underground Radio

1999
- Acoustic Stirling Heat Engine
- Atmospheric Pressure Plasma Jet
- CHEMIN: A Miniaturized X-Ray Diffraction and X-Ray Fluorescence Instrument
- PREDICT—A New Approach to Process Development
- Real-Time, Puncture-Detecting, Self-Healing Materials
- REED-MD: A Computer Code for Predicting Dopant Density Profiles in Semiconductor Materials
- The Sulfur Resistant Oxymitter 4000™

2000
- ANDE: Advanced Nondestructive Evaluation System
- Electroexploded Metal Nanoparticles

2001
- Free-Space Quantum Cryptography
- SCORR—Supercritical CO_2 Resist Remover
- Tandem-Configured Solid-State Optical Limiter

2002
- GENIE: Evolving Feature-Extraction Algorithms for Image Analysis
- HDF5 – Hierarchical Data Format

2003
- CARISS: Integrated Elemental and Compositional Analysis
- BASIS: High-Confidence Biothreat Detection and Characterization
- FIRETEC: A Physics-Based Wildfire Model
- Flexible Superconducting Tape
- FlashCT
- Green Destiny
- PowerFactoRE: A Suite of Reliability Engineering Tools for Optimizing the Manufacturing Process
- Super-Thermite Electric Matches

R&D 100 Awards Sponsorship

The Industrial Business Development (IBD) Division serves as the link for technology transfer and Laboratory collaborations with private industry, universities, government agencies, and other national laboratories. IBD matches Laboratory scientific and technical talent, expertise, and facilities with research and development endeavors in external sectors for the advancement of national security, technological innovation, and economic competitiveness.

As part of our commitment to the transfer of technology beyond the Laboratory, IBD coordinates Laboratory participation in the annual R&D 100 Awards competition. In collaboration with technical staff and a dedicated, professional publications team from the Information Management Division, IBD submits the Laboratory's most innovative technologies to the R&D 100 review panel.

Contact information:
For information about R&D 100 participation, contact:

Cindy Boone
(505) 667-1229
boone@lanl.gov

For information about licensable technologies, contact:

John Mott, Ph.D.
(505) 665-0883
jmott@lanl.gov

For information about IBD, visit us on the Web at: http://www.lanl.gov/partnerships